



SMART GRID INTEROPERABILITY PANEL (SGIP) HISTORY AND LESSONS LEARNED

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Stuart McCafferty, GridIntellect



ERICH W. GUNTHER, P.E., IEEE FELLOW

- **Chairman and CTO, Cofounder – EnerNex – Knoxville, TN**
- M.Eng. Electric Power 1984
Rensselaer Polytechnic Institute (RPI)
- Strategic energy systems consulting engineer
- > 30 years electric utility engineering experience
- Extensive experience with utility communications networks, technology, reliability, security
- NIST Disaster Resilience Fellow
- NIST Smart Grid Interoperability Panel (SGIP 1.0)
Administrator, lead of stakeholder relationship management – SGIP 2.0 Board of Directors Vice Chairman
- Requirements Facilitator – California Local Energy Assurance Program (CaLEAP)
- Chairman of Utility Communication Architecture International Users Group (UCAIug)
- Chairman and Member Emeritus US DOE GridWise Architecture Council
- Member IEEE Smart Grid Advisory Committee
- GridWeek 2007, 2008, 2010 awards in recognition of technology leadership



STUART McCAFFERTY, PMP®

- **President of GridIntellect and ChargeDefense**
- B.S., US Air Force Academy, 1984
- GridIntellect is a certified Veteran Owned Small Business focused on the electric power industry, primarily in the areas of Smart Grid and MicroGrid technologies. ChargeDefense is a product company focused on mobile charging solutions.
- > 30 years systems engineering experience
- **Recent accomplishments**
- 2014: Invented, manufactured, and selling the Juice-Jack Defender®, a USB device that prevents identity theft and malware while charging mobile devices. Black Hat, the internationally-recognized "ethical hacker" users group, identified this vulnerability as the #1 threat to mobile device users.
- 2013: Awarded the international Project Management Institute's (PMI) Distinguished Project Award for the NIST SGIP Standards Acceleration Project.
- 2012-2013 EnerNex Team Member – California Local Energy Assurance Program (CaLEAP)
- 2009-2013: Lead executive and program manager for NIST Smart Grid Interoperability Panel (SGIP). Led the PMO, managing 18 Priority Action Plans (PAPs) and their project managers on a 4 year, \$20M program



SMART GRID - THE NIST ROLE

***Energy Independence and Security Act (EISA) of 2007
Title XIII, Section 1305.
Smart Grid Interoperability Framework***

In cooperation with the DoE, NEMA, IEEE, GWAC, and other stakeholders, **NIST** has “primary responsibility to **coordinate development of a framework** that includes protocols and model standards for information management **to achieve interoperability of smart grid devices and systems...**”



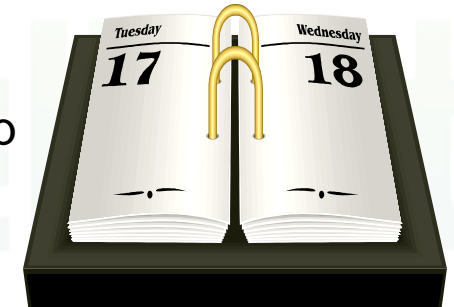
NIST SMART GRID TIMELINE

- ← Dec 2007 – Energy Independence and Security Act
- ← Aug 2008 – NIST forms Domain Expert Working Groups w/GWAC
- ← Nov 2008 – NIST Workshop at Grid-Interop 2008 in Atlanta

2009
January
February
March
April
May
June
July
August
September
October
November
December
January

- ← Feb 17 – American Reinvestment and Recovery Act
- ← Mar 19 – FERC Smart Grid Policy Statement and Action Plan
- ← George Arnold: National Coordinator for SG Interoperability

NIST Smart Grid Interoperability Roadmap Workshops and Development



Priority Action Plans & SGIP Charter Development (to Nov 12)

- ← NIST Smart Grid Interoperability Framework 1.0 Draft
- ← SGIP Update Webinars – Oct 9, Oct 28, Nov 12
- ← SGIP Inaugural Meeting November 16-19
 - Charter Ratified
 - Governing Board First Meeting Dec 8-9
- ← NIST Smart Grid Interoperability Framework 1.0

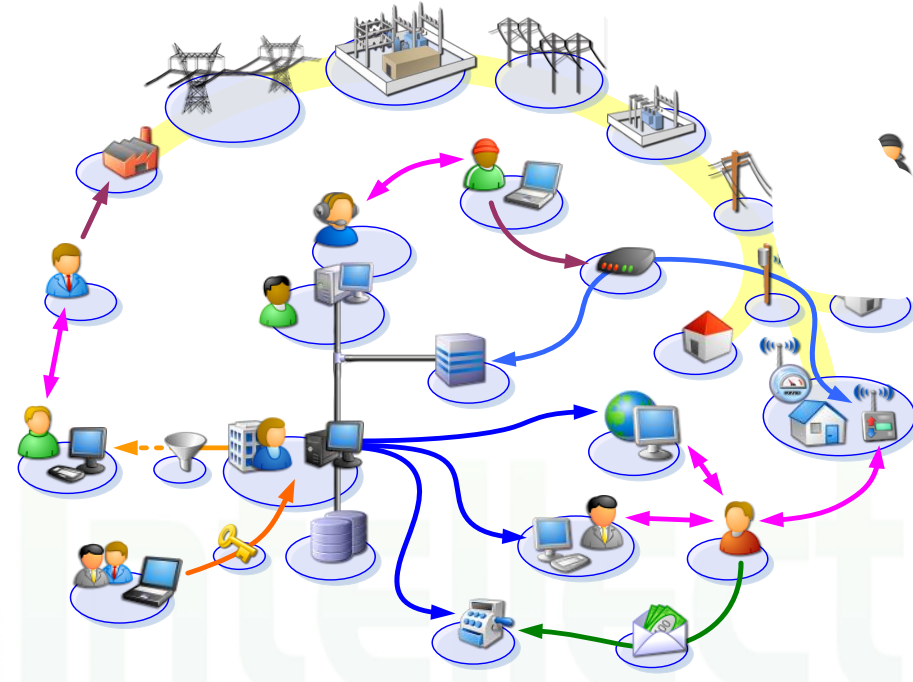
INITIAL PRIORITY ACTION PLANS (PAP)

0. Meter Upgradability
 1. Use of IP in the Smart Grid
 2. Wireless Guidelines
 3. Pricing Model
 4. Scheduling
 5. Meter Profiles & Upgrade Std.
 6. Common Semantic Model (CIM)
 7. Storage Interconnect
 8. CIM Distribution Models and Harmonization
 9. Standard DR Signals
 10. Energy Usage to Customer
11. Common Data Models for Electric Transportation
12. DNP3 to IEC 61850 Mapping
13. SynchroPhasor Data Harmonization (C37.118 to IEC 61850) and Time Synchronization
14. Integrate Transmission & Distribution Model Mapping
15. Harmonize Power Line Carrier Standards
16. Wind Plant Communications
17. Facility Smart Grid information



ORIGINAL STAKEHOLDER CATEGORIES

1.	Appliance Manufacturers
2.	Commercial & Industrial Manufacturers
3.	Residential, Commercial & Industrial Consumers
4.	Electric Transportation
5.	Electric Utility – IOU and Public Utilities
6.	Electric Utility - Municipal
7.	Electric Utility – Rural Electric Association
8.	Electricity & Financial Market Traders
9.	Independent Power Producers
10.	Information and Communication Technologies (ICT) Infrastructure Providers
11.	ICT Application Developers & Integrators
12.	Power Equipment Mfg and Vendors
13.	Professional Societies, Users Groups, Trade Associations and Industry Consortia
14.	R&D Organizations and Academia
15.	Relevant Federal Government Agencies
16.	Renewable Power Producers



17.	Retail Service Providers
18.	Standard Development Organizations
19.	State & Local Regulators
20.	Testing and Certification Vendors
21.	Transmission Operators and Independent System Operators
22.	Venture Capital

TODAY'S INTEREST CATEGORIES

- **Manufacturers**

Provide the equipment, software and communications gear and solutions for the safe and efficient generation, delivery and utilization of energy. *Includes: software designers and manufacturers of semiconductors, communications equipment, control systems, generation, transmission, distribution, measuring, storage, testing and safety equipment.*

- **Asset Owners**

Own and invest in the infrastructure and communications to produce, transport and/or distribute energy. *Includes: vertically integrated utilities, co-operative and municipal utilities, "wires" companies, ITCs, independent power producers, renewable energy producers, including hydro, wind, solar, and biomass, together with other privately and publicly owned entities producing or delivering energy using their assets.*

- **Service Providers & System Administrators**

Provide services in the energy industry including the independent operation/management of transmission or distribution systems. *Includes: consultants, electricity or financial market traders or brokers; entities which offer electric energy and related services at unregulated prices directly to retail customers; ISOs/RTOs/DSOs; aggregators; organizations that provide design, conformance or compliance testing services; certification services; or funding for the development or operation of energy equipment, systems or services.*

- **Consumers, Policy & Government**

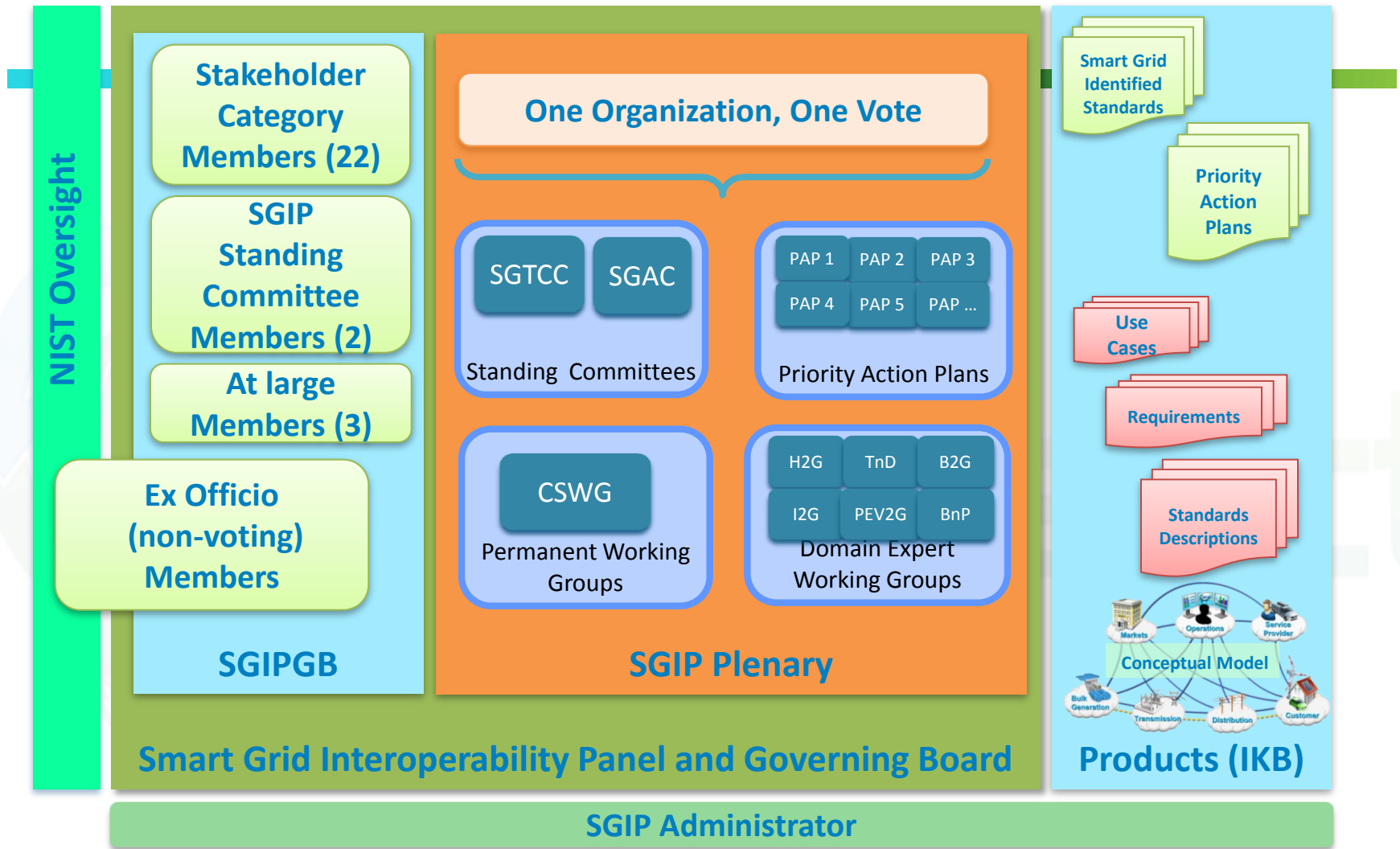
Consume energy or develop/implement policies governing the production and delivery of energy and related services to such consumers. *Includes: residential, industrial and commercial consumers of energy together with thought leaders who help develop appropriate policies and analysis (e.g., academia, research and teaching organizations) and implementing governmental authorities (e.g., federal, state and local governmental entities).*

- **SDOs & Consortia**

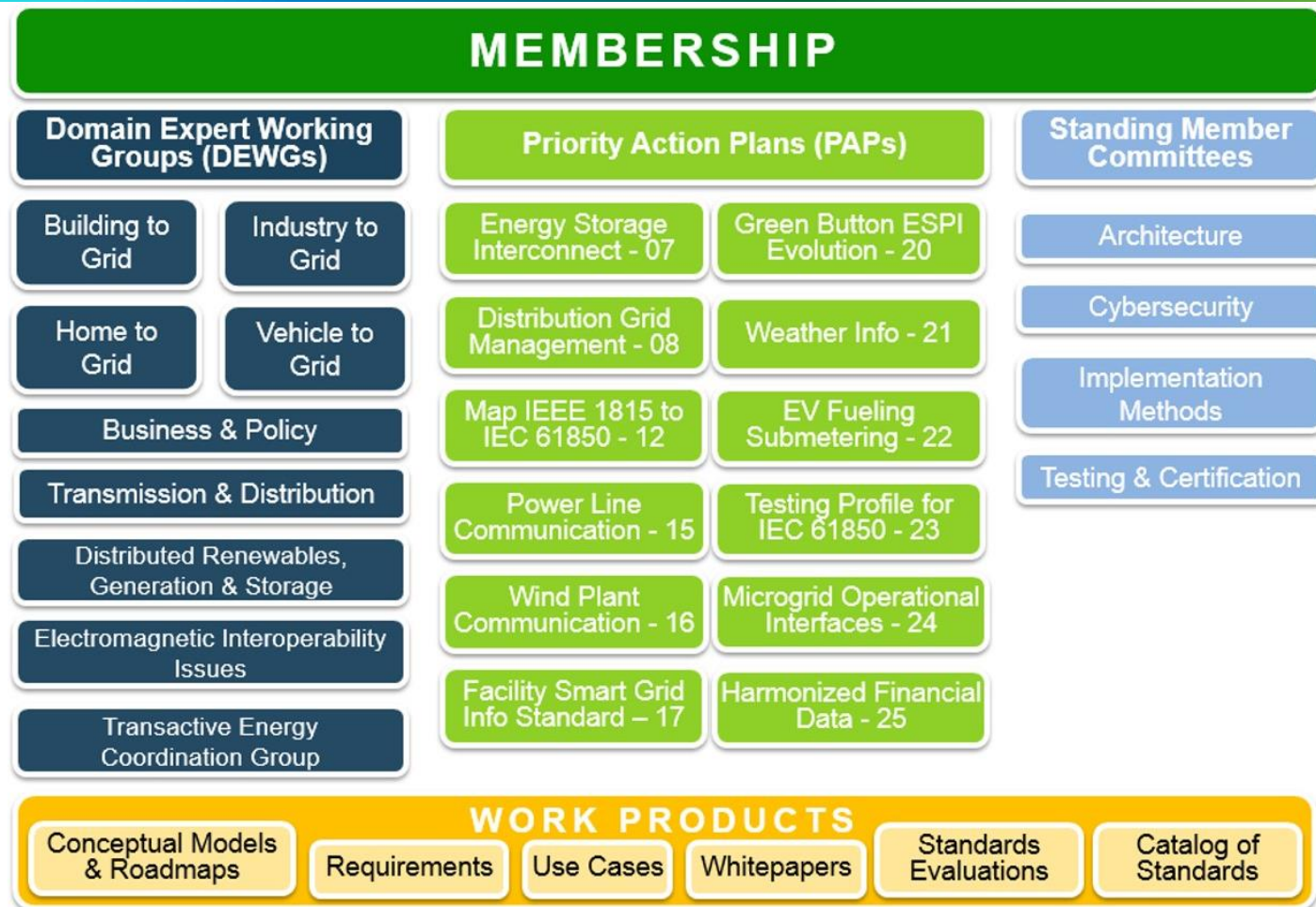
Develop and communicate broad industry positions, technologies and standards. *Includes: associations, standards development organizations, SSOs, consortia, alliances, societies, user groups, trade associations, etc.*



ORIGINAL SGIP STRUCTURE



ORGANIZATION EVOLUTION



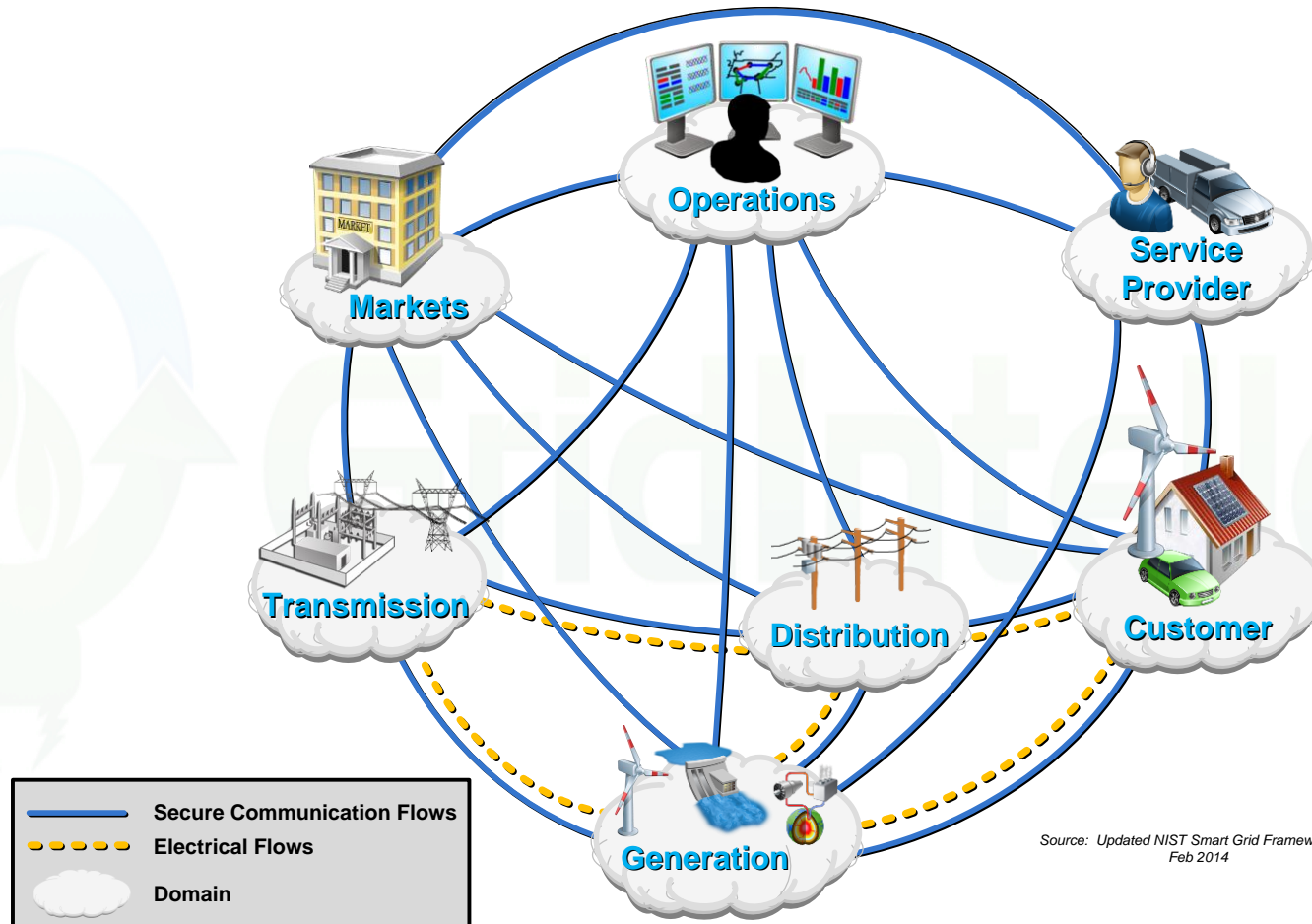
SGIP: GOVERNING BOARD VISION

- Maintains a broad perspective of the NIST Interoperability Framework and supports NIST
- Provides guidance and tools that make it an impartial and practical resource for SG stakeholders
- Members representing a broad community based on breadth of experience and involvement
 - Each stakeholder community represented on Governing Board
 - Additional at-large and ex-officio members
 - Supports SGIP goals and objectives as a whole, rather than any individual organization or stakeholder group
- Consensus is a core value
 - All legitimate views and proposals are considered



GridIntellect

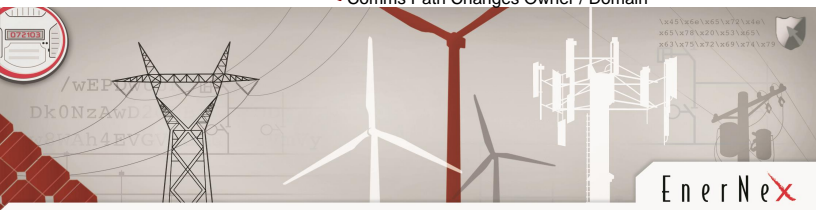
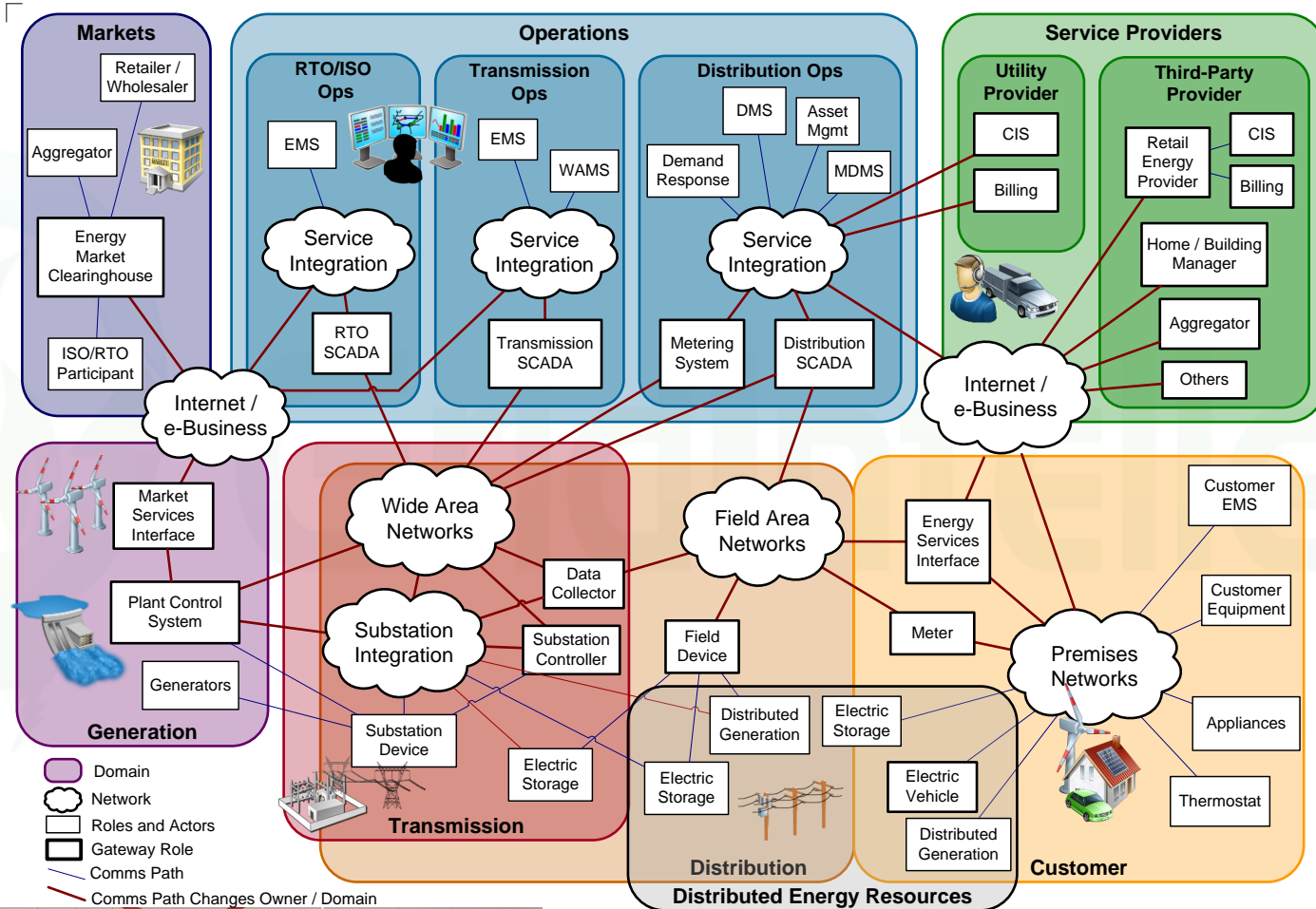
KEY ARTIFACTS: NIST SMART GRID CONCEPTUAL MODEL



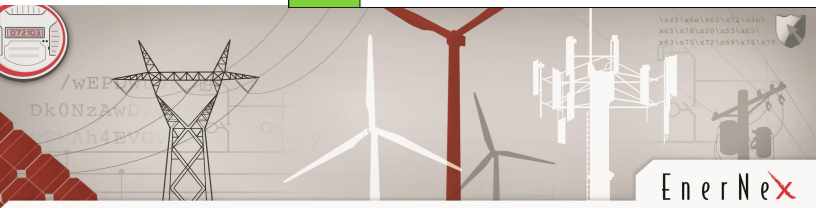
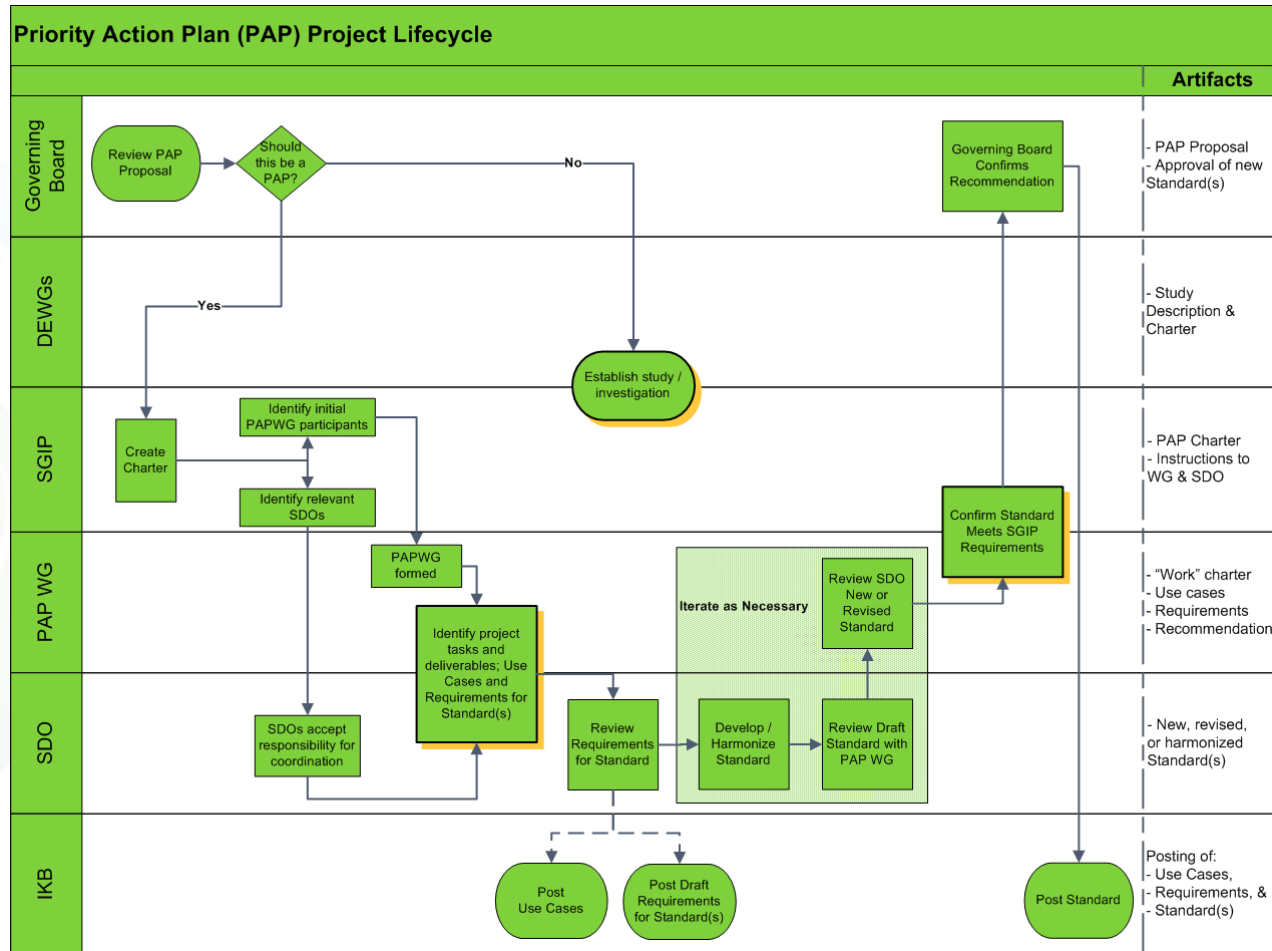
Source: Updated NIST Smart Grid Framework 3.0
Feb 2014



KEY ARTIFACTS: NIST SMART GRID LOGICAL DOMAIN MODEL



PROCESSES EVOLVED TO SUPPORT ORGANIZATION





YEAR IN NUMBERS

2014



3 Face-to-Face Meetings
DENVER | PORTLAND
NASHVILLE



1 SGIP.org Redesign
Launched in March

2 New infographics
cybersecurity
interoperability
Under
SGIP.org/publications



NEW GROUP!
Transactive Energy
Coordination Group

14 Technical Publications

Cybersecurity. Home-to-grid. SMUD. Energy storage. MultiSpeak®. PNM. Testing. DTE.

Available now at SGIP.org.



New Entries into the Catalog of Standards

OpenADR Profile A & B

SEP 2.0

CEA 709 Parts 1-4

CEA 852 Series

MultiSpeak V3 & MultiSpeak Security V1.0

NISTIR 7761 R1

CEA/CEDIA/CEB-29

+9 more standards going to vote in early 2015



3 Priority Action Plans completed their work

PAP-02 Wireless Communications

PAP-09 Standard DR and DER Signals

PAP-19 Wholesale Demand Response (DR) Communication Response

3 Priority Action Plans began their work



PAP-23
Testing for IEC 61850, Communications Networks and Systems in Substations



PAP-24
Microgrid Operational Interfaces



PAP-25
Harmonization of Financial Data



FIRST ANNUAL
Call for Papers Challenge and



2014 SGIP MEMBER INTEROPERABILITY CHALLENGE

New challenges will be posted in early 2015!

7 Educational Webinars

Cybersecurity. Policy making. SMUD. ITCAs. Transactive Energy. GWAC. Networked Infrastructure.

Available now at SGIP.org/Webinars.



JOIN SGIP FOR 2015



Access. Exposure. Expertise.

Learn more at SGIP.org

KEY LESSONS LEARNED

- Governing Board of respected experts supports organizational credibility and helps map theory to practice
- Priority Action Plans keep work focused, allows for prioritization, supports mapping to appropriate domain experts
- Conceptual and Logical Models – provide context for the effort and allows stakeholders to see where they fit into the ecosystem
- Technical Champions – experts embedded in key SDO's and stakeholder organizations to accelerate progress
- Collaborative events and tools are important
- IKB – Easy to access repository of work products – includes Catalog of Standards (CoS) with rich summary and application information – similar to Physicians Desktop Reference



QUESTIONS?

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